15.—Glaciated Pavement in the Ripon Hills, Western Australia*

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Introduction

During 1958 a combined party from the Bureau of Mineral Resources and Geological Survey of Western Australia mapped manganese deposits in the Ripon Hills (see Fig. 1). During this mapping a glacial pavement was discovered. Good outcrop of rock makes it possible to reconstruct the history of the glaciation and the later events.

Glacial deposits of late Palaeozoic age are known in Western Australia from the Collie Basin, Irwin River Basin, Carnarvon Basin, Lake Carnegie-Wilkinson Range area, Bonaparte Gulf Basin, Fitzroy Basin, and the south-west part of the Canning Basin.

Glacial pavements are known to outcrop on the edge of the Carnarvon Basin in Nyarra Creek on the west side of the Carrandibby Range and at a locality about 4 miles east of Coordewandy Homestead (Konecki, Dickins and Quinlan 1958, p. 17). In addition a number of glacial pavements are known in the Pilbara District between the Nullagine and Oakover Rivers. J. N. Casey has allowed the author to examine an unpublished paper (Traves and Casey, unpublished paper) in which two of these pavements are described: one two miles north of Carawine Gorge and the other 14 miles to the south-east (Casey and Wells 1956). The present paper describes a third glaciated pavement from this area which differs from those described by Traves and Casey in that it is not considered to be a roche moutonnée.

Geology of the Pavement Area and Description of the Pavement

The glacial moraine at Ripon Hills is correlated with the Braeside Tillite and the Paterson Range Formation. Neither of these formations is known to be fossiliferous and it is only known for certain that the glacials were deposited between Upper Proterozoic and Upper Triassic or Jurassic times. Traves and Casey consider that the Braeside Tillite is probably of the same age as the Grant Formation of the Fitzroy Basin and the Lyons Group of the Carnarvon Basin and hence assign a tentative Lower Permian age to it.

The pavement is carved into chert breccia of probable Upper Proterozoic age (see Fig. 1). The chert breccia is folded into a number of closely spaced amoeboid domes and basins which are reflected in the present topography: the folding is probably the result of faulting.

Examination of aerial photographs shows a strong northerly-trending lineament, on the east side of which the breccia has been uplifted to form a strong range of hills. To the west the relief is rugged but the hills are generally lower.

The pavement lies at the base and at the northern edge of the eastern range of hills. It is mound-shaped (see Plate I, Fig. 1) and elongated in the direction of ice movement, and has a polished surface exhibiting striations, grooves, chatter marks, and pitting due to ice plucking (see Plate I, Fig. 2). These features show that ice movement was in the direction 335° and indicate that the glacier descended from the range of hills to the immediate south.

To the west and north the pavement is overlain by tillite and fluvioglacial sandstone. The tillite contains boulders up to 2 feet in diameter, dominantly of sandstone, basalt, chert, and chert breccia. The glacial sediments are draped over the pavement and probably extend north-north-west under the Tertiary cover. The moraine is interpreted as terminal moraine.

(?) Tertiary sediments form a lake deposit. The lake formed after the glaciation and its sediments abut against the glacial moraine. Similar deposits occur further east, where they appear to grade into the Oakover Beds.

Throughout the Ripon Hills erratics are common. The erratics occur on the tops of hills and in valleys. One boulder of granite presents clear evidence that it was derived from beyond the present limits of the Ripon Hills.

Conclusion

A glacial pavement occurs at Ripon Hills. It lies at the base of a range of hills from which the glacier descended. On reaching the valley below, the ice melted, dumped its load, and formed contemporaneous fluvioglacial deposits, which protected the pavement from erosion. Later, in (?) Tertiary times, a lake formed north of the glacial deposits. Detritus deposited in the lake is now found dipping off the glacial moraine and has assisted in protecting the pavement and associated glacial deposits from subsequent erosion.

References

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Konecki, M. C., Dickins, J. M., and Quinlan, T., 1958.—The geology of the coastal area between the Lower Gascoyne and Murchison Rivers, Western Australia. *Rep. Bur. Miner. Resour. Aust.* 37.

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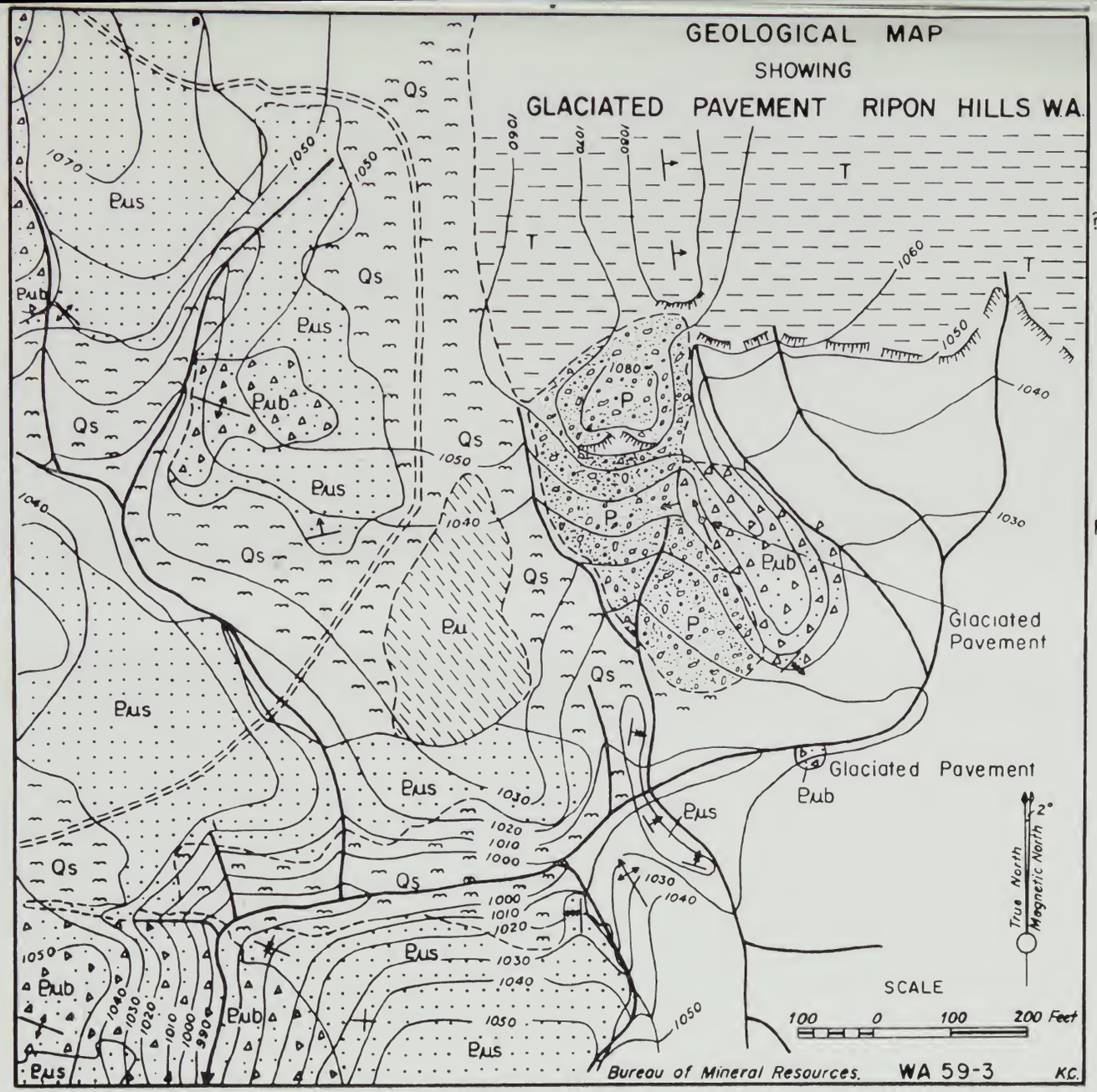
PLATE I

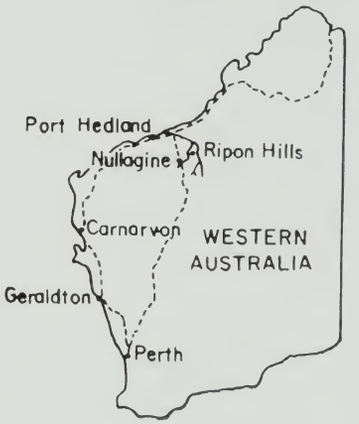
Fig. 1.—Glaciated pavement in the Ripon Hills. View, looking slightly west of north, showing: pavement in foreground, glacial sediments in west cliff face and lake sediments in east cliff face. Both breakaway scarps may be seen.

Fig. 2.—Glaciated pavement in Ripon Hills. View looking south-east showing polished undulating surface of chert breccia on west side of pavement.



		Correlated with	Lithology
QUATERNARY	Qs		*Rubble, Soil, alluvium*
?TERTIARY	T	Oakover Beds	*Conglomerate, poorly sorted angular sandy silstone*
PERMIAN	P	Braeside Tillite	*Tillite and fluvioglacial sandstone*
	Unconformity		
UPPER PROTEROZOIC	Pu		*Silicified silstone and conglomerate*
	Unconformity		
	Pus		*Manganiferous and ferruginous siltstone*
	Pub		*Chert breccia and ripple marked sandstone*
	Unconformity		

LOCALITY MAP



Geological boundaries

- *Established boundary — position accurate*
- *Established boundary — position approximate*

Strike and dip of strata

- *Dip 0°-15°*
- *Dip 15°-45°*
- *Dip 45°*
- *Horizontal*

Folds

- *Established anticlinal crest — position accurate showing plunge*
- *Established synclinal trough — position accurate showing plunge*

- *Direction of glacial striae*
- *Stream*
- *Breakaway*
- *1000 Contour height assumed*